

Adaptation Strategies of Farmers to Counter the Impact of Violent Incidents in the Three Southern Border Provinces of Thailand

Apisith Chailap¹ and Ayut Nissapa²

¹Princess of Naradhiwas University, Thailand ²Prince of Songkla University, Thailand

Date Received: 19 March 2020 Revised: 10 May 2020 Accepted: 13 May 2020

Abstract

The objective of this research was to explore how violent incidents affected agricultural practices of farmers, how they struggled with these problems, and their methods of adaptation to permit survival. Data were collected from 26 key informants in Narathiwat, Pattani, and Yala Provinces. In-depth interviews and descriptive data analyses were used to indicate farmers' choice of adaptation strategies. The results indicated that violent incidents affected agricultural activities: some agricultural lands were abandoned, farmer numbers and farm income decreased, agricultural officials and middlemen were prevented from meeting farmers to give advice or buy their products, and investors lacked confidence to make investments. Farmers adapted to these difficulties by adjusting working hours, growing other crops, seeking low-interest loans, using agricultural machinery, hiring elderly local laborers, acquiring knowledge and technology from various online media, along with selling products to local merchants and private investors. The findings of this study can help policymakers to better understand and plan agricultural policies to aid in effective adaptation to violent incidents.

Keywords: Farmers' adaptation strategies, violence, southern Thai border

Introduction

The effective management of agricultural resources is simpler when economic, social, and political conditions are good. Under bad conditions, such as after natural disasters, dramatic socio-economic or political changes, climate change, or violent incidents, agricultural resource management is difficult and perhaps ineffective. Agricultural resource management in the vicinity of violent incidents, a problem that threatens the lives and property of people in many countries around the world, has been neglected because security-related policies have usually received higher priority (Chailap et al., 2019).

Terrorism and violent incidents are usually understood as the result of political issues, religious matters, agro-economic deprivation of the people, and in some cases, psychological reasons. Aside from the loss of human life and property, there are serious economic and political consequences. Many major socio-economic variables leading to terrorism and people's increased willingness to support it are listed below: repression, political volatility, sharp divisions in society, sectoral provincial factors, poverty and inequality, a high unemployment rate, inflation, a paucity of opportunities for development, fractionalization along ethnic and religious lines, ethnicity and religion, as well as international, institutional, and demographic factors (Frey et al., 2007; Freytag et al., 2010; Caruso & Schneider, 2011; Krieger & Meierrieks, 2011; Ismail & Amjad, 2014). Terrorists target tourists, military personnel, police, religious figures, and many others including civilians, as well as property. They use suicide attacks, bombings, hijackings, kidnappings, and armed attacks which result in casualties and damage to buildings, incurring huge economic losses (Abadie & Gardeazabal, 2003).

Not much work has been done on how violent incidents impact agricultural resource management, although several studies have analyzed its macroeconomic effects. Hence, we do not know the effects of violent incidents on short-term agricultural resource management. We know little about the persistence of these effects, although several studies have found that no long-run effects on income levels occurred because of the bombing in Vietnam (Miguel & Roland, 2005), Japan (Davis & Weinstein, 2002), and West Germany (Brakman et al., 2004). However, Abadie and Gardeazabal

¹ Corresponding author's e-mail address: ch.apisith@gmail.com

(2003) uncovered persistent effects on per capita income of a low-intensity conflict in the Basque country. Besides, in the Punjab (India), Singh (2012) found significant negative effects of terrorism on the level of investment in long-term agricultural technology, but effects were small and insignificant for short-term investment during the period of insurgency.

A number of short-term strategies have been adopted in areas stressed by such factors to address agricultural problems. A study conducted in Vietnam, where farmers had been involuntarily resettled to a remote mountain location with an intense scarcity of resources, found that livelihood outcomes were reduced, mainly due to crop output losses. In response, farmers intensified crop production by increased crop frequencies of rice; they also intensified mineral fertilizer use and livestock production. As a result, farm output and incomes increased. Some strategies were successful, and others were not (Bui et al., 2013). In Benin, a West African nation, farmers adopted a number of diversification strategies in response to climate change. These strategies included crop–livestock diversification and other good practices (mulching, organic fertilizer), use of improved varieties, use of chemical fertilizers and pesticides, and inclusion of agroforestry and perennial plantation options. The findings also revealed that most respondents used these strategies in combination (Mahouna, 2018).

The violent incidents in the three southern border provinces and four districts of Songkhla Province have directly impacted agricultural resource management. There are possibly many factors involved. Some of many accusations are that: Thai-Malays are connected to separatist groups; the United States is behind the bombings; religious groups send funds and weapons to the area; and migrants cross into Malaysia for terrorist training. Some groups deliberately cause violent incidents in order to benefit in various ways. There is a lack of understanding of Thai-Malay culture in the area, and some people believe that violent incidents are carried out by poor and uneducated people (Sanongphan, 2012; Chareonwongsak, 2012). In the short term, agricultural labourers avoid working at night in rubber plantations that are located in remote areas. In addition, they seek employment opportunities in other sectors (industrial sector, trade and services sectors) in the province or other provinces and regions, and some farming households have migrated to other provinces (Chailap, 2019). Thus, it is expected that the results of an analysis of coping strategies in managing agricultural resources amid violent incidents would be of use only in partially solving the problems in the area.

Historical Background

The three southern border provinces have an area of approximately 10,937 square kilometers, and a population 1,954,457 people (Office of the National Economic and Social Development Board, 2009). The southern border area of Thailand is attached with the northern region of Malaysia for a distance of 573 kilometers. These three southern border provinces have cultural characteristics of people in areas from other parts of the country. In these provinces, 75.5% are Muslims who prefer to speak the local Malay language, while another 24% are Thai Buddhists who are spread throughout urban and rural areas, and who have a unique history. People in the three southern border provinces experience a lot of poverty and quality of life problems. The number of poor people has increased, and there is a lack of security and career opportunities. Since a memorable violent incident in 2004, the number of poor people in the three southern border provinces has increased from 14.8% to 16.9% of the population; the highest figure in the southern region is about 20% of the population. In addition, the majority of the poor are in agriculture and local fishery operations, and in addition, they experience career problems. The proportion of the population that is still in poverty numbers 308,600 people, or 16.9% of the population in all three provinces (approximately 2,000,000 people).

The three southern border provinces are located in an advantageous region that is a favorable area for trade facilitation because it is a border location, especially when better economic structures exist. The three southern border provinces are suitable for agriculture, as the land is fertile, and other kinds of agricultural activities are possible, including various animal husbandry enterprises. These include both fresh and salt water fishery activities. The raw materials can be processed in factories, and both intra-country and border trade is possible (Sama-air & Mhadmarn, 2016).

In Thailand, major terrorism and violent incidents have occurred mostly in the southern border provinces: Narathiwat, Pattani, Yala, and four districts of Songkhla Province (Figure 1).



Figure 1. Map of the Three Southern Border Provinces and Songkhla Province

These incidents have happened regularly and have increased since 2004 (Marohabout et al., 2009). The terrorism and violent incidents have had negative consequences resulting in stagnant economic conditions and changes in peoples' lifestyle (Chareonwongsak, 2012). Those living in these areas are at the lowest economic level of the region (Office of the National Economic and Social Development Board, 2009). They have managed to do some work in the midst of the violent incidents, albeit under less than normal conditions. There also have been changes in economic growth due in part to huge sums of money the government has spent in the region during the past decade, aimed at expanding local businesses. This contrasts with the present situation in that the government currently spends very little money in the region. These violent incidents have not only resulted in loss of human life and property, but also in worsening agro-economic conditions for the local people. As examples, women have become widowed, children orphaned, local people have migrated to other provinces, and household incomes have substantially decreased, further devastating the already serious conditions. All these factors have hindered the provinces' economic growth and the welfare of the local people (Bundhuwong, 2017).

Trends in terrorism and violent incidents in the three southern border provinces of Thailand, collected by the Center for Deep South Watch (CDSW, 2018), are presented in Figure 2. During the period of 1996–2003, the frequency of terrorism and violent incidents was low. It can be observed that there was a notable increase in 2004 when certain terrorist and violent incidents took place in Pattani (the massacre at Kruse mosque), Narathiwat (clashes at Tak Bai police station), and Yala (attack on a police booth at Ban Niang). There was a sharp increase in the number of incidents until 2007.

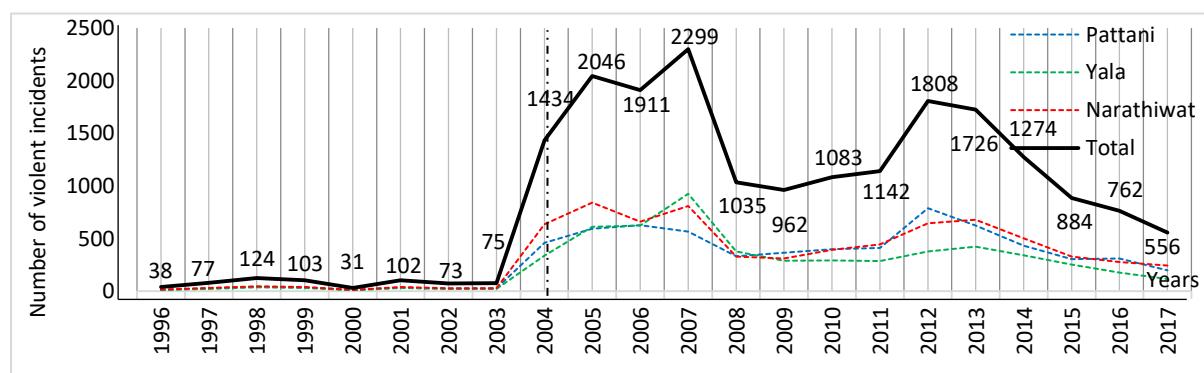


Figure 2. Number of Violent Incidents in Thailand's Three Southern Border Provinces (1996–2017)

The number of violent incidents suddenly decreased in 2008 and stayed at a moderate level until 2011. The number of violent incidents decreased from 2,299 in 2007 to 962 in 2009. It peaked again

in 2012, at 1,808, and fell gradually to 556 in 2017. However, the number of terrorist and violent incidents in these years was markedly higher than before 2004.

Agricultural gross provincial production per capita for the period of 1996–2003, when the violent incidents were low, amounted to about 27,240 Thai Baht. This value decreased to 26,210 Baht in 2001, and then increased to 29,880 Baht in 2003. For the period of 2004–2016, it can be observed that agricultural gross provincial product decreased slightly to 28,740 Baht in 2004. As violent incidents fluctuated from 2005 to 2016, the agricultural gross provincial product also fluctuated, increasing to 33,520 Baht in 2009, decreasing to 27,990 Baht in 2012, and then increasing and decreasing alternately, as presented in Figure 3 (Office of the National Economic and Social Development Board, 2009).

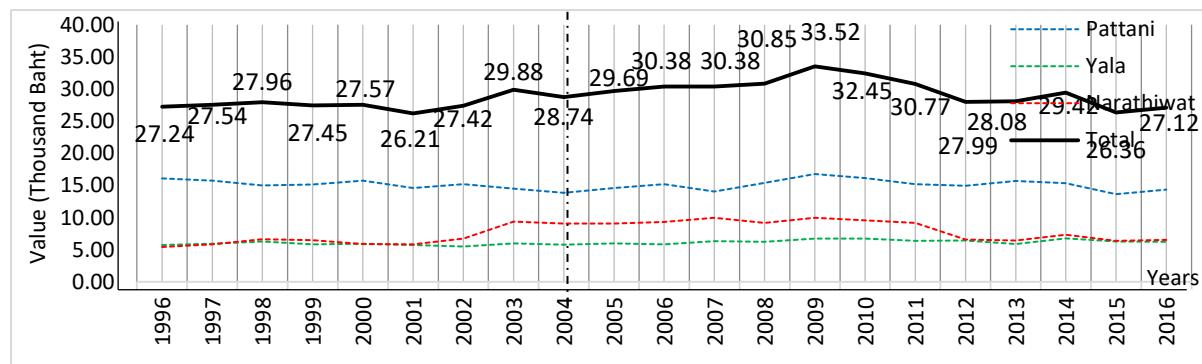


Figure 3. Value of Agricultural Gross Provincial Product (Reference Year, 2002) in the Three Southern Border Provinces (1996–2016)

Violent incidents in the three southern border provinces directly affected agricultural sector income, which has decreased (Chitphiromsi et al., 2012). This area has 0.216 million farmers, representing 11.36% of the population (National Statistical Office, 2019). The area of agricultural lands involved is 10,936,864 rai (Thaksin University, 2017), as shown in Table 1.

Table 1. Statistics on Farmers and Agricultural Areas in the Three Southern Border Provinces

Provinces	Farmers (People)	Agricultural lands (Rai)	Para-rubber (Rai)	Fruit (Rai)	Rice (Rai)	Palm-oil (Rai)
Pattani	148,392	756,505	338,714	35,107	114,278	19,101
Yala	30,944	1,292,995	1,359,444	95,138	41,373	7,060
Narathiwat	47,624	1,416,598	999,255	140,019	49,418	52,798
Total	216,960	10,936,864	2,697,413	270,274	205,069	78,959

Research Problem and Objective

Violent incidents mostly occur in developing countries and impact agricultural activities. The problem of violent incidents in Thailand's three southern border provinces has been chronic since a crucial weapon attack on January 4, 2004. Violent incidents have escalated into a large scale problem causing loss of property and lives among the local people. Understanding how farmers adapt to these events is very important to implementation of government policies for agricultural management amidst violent incidents.

The objective of this study was to study the impact of the violent incidents on agricultural resource management in the three southern border provinces, and strategies adopted for resolving agricultural problems and creating a sound agricultural resource management program.

Materials and Methods

Study Area

The study was conducted in the three southern border provinces of Thailand composed of Pattani, Yala, and Narathiwat Provinces (Figure 1). Violent incidents have occurred continuously in these areas.

Data Source

An in-depth interview approach was used in this study. The interview covered most points and was structured to make meaningful analysis of the descriptive data achievable. An in-depth interview form was developed from the review literature, related research, and from expert consultation. The current researchers organized a framework of questions that were relevant to the study and could be summarized easily. After that, the in-depth interview questions were considered by three experts in terms of content validity, comprehension of the questions, idioms, language, and appropriateness. The interview form was improved in response to the comments received. The form was pilot tested with farmers who were affected by violent incidents in the three southern border provinces. This involved two persons in agriculture.

Open-ended questions and comments were divided into two categories as follows:

1. How violent incidents have affected the agricultural practices and daily lives of farmers.
2. How the farmers have struggled with the problems in conflicted areas, and their methods of adaptation in order to survive.

Data Collection

The key informants in Pattani, Yala, and Narathiwat provinces were interviewed personally, and their responses recorded with a voice recorder until data saturation was obtained. The recorded information was transcribed and categorized according to the objectives delineated for the study.

Data Analysis

The recorded information was checked for completeness and accuracy by analyzing the data according to the study's objectives and conceptual framework using descriptive analysis (i.e., synthesis of the data from interviews, categorized according to content) to answer the two research questions.

Content Edge

The 26 key informants who were interviewed consisted of individuals who were para-rubber farmers, fruit farmers (longkong, rambutan, durian, mangosteen), rice farmers, and oil palm farmers. Our criteria for selecting key informants was that they were respected by other farmers, had extensive experience in farming, were affected by the violent incidents in the three southern border provinces, and were able to provide data from before and after the year 2004 regarding the violent incidents in the three southern border provinces. We used snowball sampling that began with asking local agricultural department staff to recommend key informants in the respective areas. Finally, we chose key informants who met particular criteria and agreed to be interviewed, as shown in Table 2.

Table 2. Key Farmer Informants Interviewed in the Provinces

Agricultural Activity	Pattani	Yala	Narathiwat
Para-rubber	1	3	2
Fruit	1	2	3
Rice	2	1	1
Oil palm	1	1	2
Totals	5	7	8

The other individuals interviewed, who were involved in agriculture, consisted of one highly respected local farmer, agricultural scholars and professors, and private sector representatives involved in agriculture. Those selected were experts in academics, agriculture, or agri-business, and were involved in agriculture in the areas of the violent incidents. They were able to provide data from

before and after 2004 regarding the impact of the violent incidents in the three southern border provinces. We used purposive sampling in order to obtain key informants who could respond thoroughly to our questions with information useful for the research, and were experts in agricultural matters. In both Pattani and Yala Provinces, an agricultural scholar and professor were among the informants chosen. In Narathiwat, an agricultural scholar and a representative from the private sector involved in agriculture were the informants.

The interviews were completed over a two month period (November–December 2018).

Data Validation

After we collected in-depth interview data, it was examined to make sure that it was correct and meaningful as follows.

Validity check. The validity of the in-depth interview data was established by first compiling it in written form. This was interpreted and fed back to the key informants so as to confirm the reliability of the data received.

Data triangulation. Verification of the in-depth interview data obtained was established by examining interview information in relation to data sources, time, location, and persons mentioned. Triangulation methods involved comparing the information obtained from the in-depth interviews with previously documented data and related study reports.

Considerations for research ethics in humans. The researchers considered the ethics involved with the key informants by contacting them before the actual interviews, informing them about the purpose of the research, and requesting permission to take pictures. An agreement was reached on what information was appropriate to present in the research, and information that would not be disclosed by the researchers.

Results

The results of how violent incidents affected the agricultural practices and daily lives of farmers, how farmers struggle with problems in this conflicted area, and their methods of adaptation are presented under a number of headings.

Impact of the Violent Incidents on Agricultural Resource Management

How Violent Incidents Affected the Agricultural Practices and Daily Lives of Farmers

In an in-depth interview, one respondent said that during the violent incidents, some agricultural lands have been abandoned because some farmers did not come to work or live on their land. Besides, the farmers felt unsafe when going to their land. For example, para-rubber farmers do not dare go to tap rubber at regular times. Normally, the tapping period is around midnight, and the latex collection period is around dawn. Each of these activities would have to be postponed for a couple of hours later than planned. The impact on agricultural production is that production occurs, but at a lower level (eight interviewees). The farmers experienced low incomes because the volume of agricultural products had decreased in response to the violent incidents, and besides, the farmers could not access capital from the government for agriculture activities (four interviewees). The number of farmers had decreased significantly in risky areas because the farmers could not come to work due to concerns about safety. Moreover, many had moved to work in other provinces and neighboring countries, and some even had changed jobs to work in other sectors which were less risky and provided more income (six interviewees). Agricultural officials could not come into the areas to meet the farmers. As a result, they were unable to provide agricultural knowledge and technological information to improve the soil in order to increase the yield per rai (13 interviewees). Middlemen from outside the areas could not come to buy agricultural products because of the risk involved. Thus, it was difficult for farmers to sell their produce, resulting in low prices received (six interviewees). Investors from outside these areas also lacked confidence to invest in agro-industry in these provinces. This was despite the government encouraging and trying to persuade the private sector to invest in agro-industry in these areas. Incentives offered included eliminating various taxes and offering low interest loans (five

interviewees). In conclusion, the violent incidents had affected both agricultural practices and the daily lives of farmers as summarized in Table 3.

Table 3. Impact of the Violent Incidents on Agricultural Resource Management

Agricultural Resource Management Impacts in the Three Southern Border Provinces

1. Some agricultural lands had been abandoned.
2. Farmers had low incomes and could not access capital from the government for agriculture.
3. The number of farmers had decreased significantly; some have changed jobs to work in other sectors.
4. Agricultural officials could not come into the areas to meet farmers.
5. Middlemen from outside the areas could not come to buy agricultural products because of the risks.
6. Investors from outside these areas lacked confidence to invest in agro-industry in these provinces.

Short-term Adaptation Strategies in Resource Management for Coping with Agricultural Problems

Violent incidents affected agricultural practices and the daily lives of farmers. Various strategies were adopted to enable them to survive. From in-depth interviews, one respondent said that while some agricultural lands have been abandoned, other farmers had adjusted working hours to suit the conditions in the area. For instance, para-rubber farmers now came to tap the latex in the morning instead of around midnight. Hired farm hands were enabled to get to and from farms by coordinating with networks that monitored security in the areas (eight interviewees). As soon as farmers were confronted with low incomes, some grew herbs and other plants to increase their incomes. They also might concentrate on improving both the soil and their farming methods. Some sought funding via low-interest loans from government financial institutions (four interviewees).

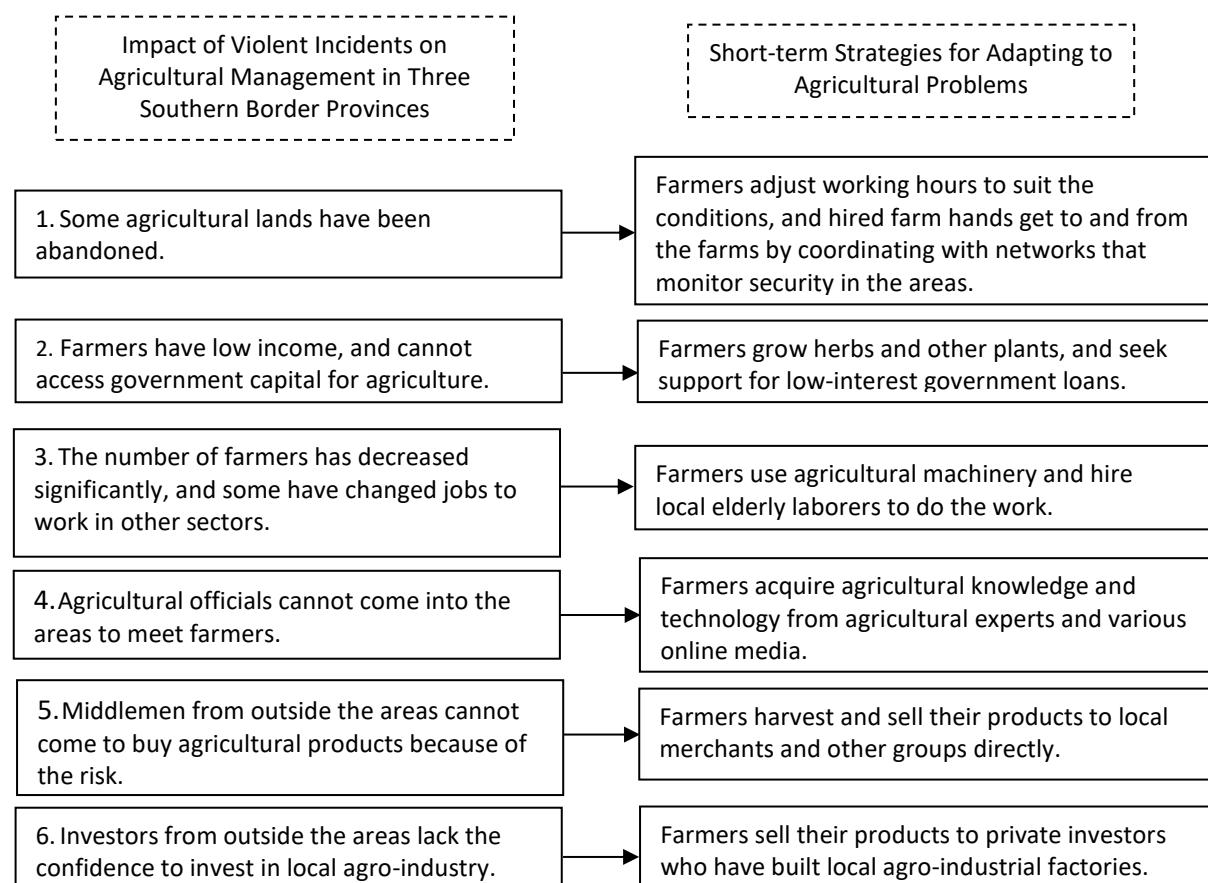


Figure 4. Short-term Strategies Adopted to Resolve Agricultural Problems Following Violent Incidents

Sometimes non-agricultural workers enjoy better incomes and are safer. Therefore, some farmers decided to transfer to non-agricultural work, resulting in a reduction to the number of farmers. The

more resourceful farmers sometimes opted to use agricultural machinery, and in other cases hired local elderly laborers to do the farm work instead (six interviewees). Difficulties in accessing agricultural knowledge and technology from agricultural experts was partially substituted for through gaining access to various online media (13 interviewees). Lack of access to middlemen from outside the areas to buy agricultural products because of the risk was resolved by farmers selling their products to local merchants and other groups directly (six interviewees). This might also involve selling to private investors who had already built agro-industrial factories in the areas (five interviewees).

In conclusion, violent incidents in the three southern border provinces of Thailand have affected agricultural resource management. Farmers have adopted different strategies to adapt to the impacts of violent incidents; the main adaptation strategies of farmers identified are shown in Figure 4.

Discussions and Suggestions

Impact of Violent Incidents on Agricultural Resource Management

The findings indicated that the violent incidents affected agricultural practices and the daily lives of the farmer sub-groups involved. The para-rubber farmers could not tap rubber at the regular time and fruit growers could not sell their products to middleman from outside the areas. Besides, agricultural officials were unable to come into the areas to meet either fruit growers or rice farmers. The number of such farmers—and palm oil farmers as well—has decreased significantly due to concerns about safety, and some are likely to move to other provinces or neighboring countries.

The perception among farmers is that violent incidents will continue. Thus, the governmental sector needs to remain vigilant to maintain order by arresting terrorists according to the law. Other relevant government agencies have the capacity to solve various agricultural problems, including increasing farmer incomes. Failure to do so will cause individuals to emigrate to other provinces (Kitthaworn et al., 2007). Government agencies could take a central role in driving investment in the agriculture sector, overseeing production and marketing, and they might also create incentives for other types of investment in the troubled areas. The promotion of education and human resource development would also aid in alleviating the issues experienced. It may even be possible to set up agricultural industrial estates in special economic development zones in these provinces to create jobs, motivate laborers to return to work in the area, promote and develop human resources in accordance with the need for laborers, and support economic development in the areas (Chitphiromsi et al., 2012). However, no future plans to keep pace with market changes, nor concrete mechanisms to solve the problem of providing land for those people who have none to cultivate, have been devised yet (Sama-air & Mhadmarn, 2016; Department of Agriculture, 2013; Sama-air & Mhadmarn, 2016).

Short Term Strategies Adopted to Resolve Agricultural Problems Following Violent Incidents

The findings indicated that farmers were well aware of violent incidents, and had a good picture of its effects on agricultural production; they had adopted different strategies to adapt to these changes. Hence, the para-rubber farmers adjusted working hours to go tapping rubber at irregular times, while fruit growers sell their products to local merchants and other groups directly. Besides, fruit growers, rice farmers, and palm oil farmers use agricultural machinery and hire local elderly laborers to do the work to cope with the shortage of laborers, as well as acquire agricultural knowledge and technology from agricultural experts and various online media. The farmers' choices for adopting a given strategy could have two purposes—either for increasing income or avoiding risk. The various strategies adopted by farmers showed that they were seeking to strengthen their farming systems. Whatever the choice, the farmers aimed to ensure their income and reduce risk (Bui et al., 2013; Mahouna et al., 2018).

Farmers have also suggested that the relevant agencies should visit the farms regularly. These agencies could help to develop and enhance the local economies, according to Thailand's Sufficiency Economy Principles, assist farmers using old technologies to adopt new ones, and also transfer knowledge and technologies useful in processing and marketing. However, there is little government sector interest in supporting the purchase of agricultural products (Chitphiromsi et al., 2012; Sama-air

& Mhadmarn, 2016), and there is no concrete mechanism or solution for solving the problem of low-price agricultural products, such as by adding value through processing. The government sector could establish special economic development zones in these provinces so that industrial and agriculture activities could drive development by linking all dimensions in selected cities—market high quality products, promote the aforementioned market, and create economic opportunities across the Thai-Malaysian border (Sama-air & Mhadmarn, 2016). Besides, the related agencies could establish a Halal industry to create income for people in the area, revitalize agricultural professions to raise the standard of living, help farmers develop according to local economic conditions, and provide more low-interest loans and initial funding from government financial institutions, such as the Bank for Agriculture and Agricultural Cooperatives, Small and Medium Enterprise Development Bank of Thailand, and others (Chitphiromsi et al., 2012). However, the government sector still lacks mechanisms for helping low-income farmers, it has no source of dedicated funds, and it is unable to easily access sources of capital in order to invest in agriculture (Songsom, 2009; Bunmak, 2013; Sama-air & Mhadmarn, 2016). In addition, the relevant agencies could establish local fruit separation centers to enable farmers to sell their agricultural products to middlemen, and sell products on social media, where they could also trade directly, thereby reducing the risks associated with traveling to deliver agricultural products (Chitphiromsi et al., 2012).

However, the governmental sector has not developed initiatives to promote agricultural science in the three southern border provinces. To compound these problems, people do not have advanced knowledge in agricultural development, but they still request officials from agricultural organizations to come and organize training, transfer knowledge, and inform them about agricultural technology (Department of Agriculture, 2013). While people in these areas possess basic knowledge on the fertility of the ground, they still lack knowledge to help ensure maximum yields are obtained (Sama-air & Mhadmarn, 2016).

In conclusion, the impacted farmers showed a remarkable adaptive capacity amid the problems they faced. Those who had developed an adaption strategy were better able to restore their farm output and household income levels. However, it is necessary for the government sector to become more efficient in assisting farmers to solve their problems. One way this can be facilitated is by incentivizing private investors to build agro-industrial factories, e.g. for producing frozen food, and processing para-rubber latex or palm oil. Such factories would create jobs and provide income.

Conclusions and Policy Recommendations

The violent incidents in the three southern border provinces of Thailand affected agricultural practices and farmers' daily lives such that some agricultural lands have been abandoned, farmers have low incomes, and they cannot access capital from the government for agricultural activities. The cumulative effect is that the number of farmers has decreased significantly as many have moved to work in other provinces and neighboring countries. Agricultural officials cannot come into the areas to meet farmers, middlemen from outside the areas cannot come to buy agricultural products, and outside investors lack the confidence to invest in agro-industry in these areas.

This paper also showed that farmers ability to adapt to the violent incidents depends on their perception of these events, the need to provide solutions, and being aware of the opportunities available. The farmers had a clear perception of its effects on agricultural production. Thus, they have adopted different strategies to adapt to these changes. Their main adaptation strategies that were identified include adjusting working hours to suit the conditions in the areas, hiring farm hands to get to and from the farms by coordinating with networks that monitor security in the areas; growing herbs and other plants, and also seeking support for first and low-interest loans from the government, using agricultural machinery, and also hiring local elderly laborers to do the work. They also acquired agricultural knowledge and technology from agricultural experts and various online media, they sell their products to local merchants and other groups directly, and sell their products to private investors who have built agro-industrial factories in the area. However, there are some barriers that challenged the ability of farmers to cope with the violent incidents.

The findings of this study can help policymakers to better think and plan agricultural policies in terms of adaptation to violent incidents. The government sector can include violent incident adaptation policies in their development agenda. Indeed, choices made in terms of public policies can be decisive. Some agricultural policies may exacerbate the impact of violent incidents, while others may be effective in increasing and securing farmers' incomes. The design and implementation of any violent incidents amelioration policy requires adequate knowledge about the level of vulnerability, the population's existing knowledge about the risks they are exposed to, the adaptation practices adopted, existing capacity to adapt, and perceived barriers to adaptation. This study provides evidence that agrees with the conclusions of Bui and colleagues (2013). To be effective, agricultural policies designed to enhance adaptation capacity should integrate the following information:

- Disseminate techniques designed to increase yields per area.
- Provide equitable access to the means of production.
- Ensure sufficiently stable prices for agricultural produce.

Acknowledgments

The authors express their sincere thanks to the Deep South Coordination Center and the Faculty of Science and Technology, Prince of Songkla University, Pattani Campus, Thailand, for generously providing data. We express our gratitude to the Faculty of Natural Resources, Prince of Songkla University, Hat Yai Campus, for providing an opportunity to conduct this study. We would like to thank the Office of the Higher Education Commission for providing research grants.

References

Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque country. *American Economic Review*, 93(1), 113–132.

Brakman, S., Garretsen, H., & Schramm, M. (2004). The strategic bombing of cities in Germany in World War II and its impact on city growth. *Journal of Economic Geography*, 4(2), 201–218.

Bui, T., Schreinemachers, P., & Berger, T. (2013). Hydropower development in Vietnam: Involuntary resettlement and factors enabling rehabilitation. *Land Use Policy*, 31, 536–544.

Bundhuwong, C. (2017). Sētthakit læ kānphatthanā nai phūnthsī čhangwat chāidāen phāk tai : kānsamrūat chāeng wiphāk [Economy and development in southern border provinces: A critical investigation]. In A. Unno (Ed.), *Nung thotsawat mānutschayawithayā læ sangkhomwithayā kap kānsuksā čhangwat chāidāen phāk tai* [One decade of anthropology and sociology with southern border provinces education] (pp. 31–68). <https://socanth.tu.ac.th/ccscs/outreach/media/publication/anusorn-ed-2560/>

Bunmak, S. (2013). Remittances: Malay-Thai workers in Malaysia. *Parichart Journal, Thaksin University*, 26(1), 74–93. <https://so05.tcithaijo.org/index.php/parichartjournal/article/view/42944>

Caruso, R., & Schneider, F. (2011). The socio-economic determinants of terrorism and political violence in western Europe (1994–2007). *European Journal of Political Economy*, 27(1), 37–49.

Center for Deep South Watch. (2018). *Summary of incidents in deep Southern Thailand*. <https://deepsouthwatch.org/sites/default/files/blogs/attachment/datasheet-032020-en.pdf>

Chailap, A., Nissapa, A., & Somboonsuke, B. (2019). Association of macroeconomic indicators with violence incidents in Narathiwat province of southern Thailand—responses for adaptive agricultural management. *Proceeding of International Conference on Sustainable Agriculture, Chiangmai, Thailand*, 2, 9–22. http://icsa.mcc.cmu.ac.th/proceeding/Proceeding_P09-22-NS05-Apisith%20Chailap.pdf

Chareonwongsak, K. (2012). Sētthasāt wādūai kānkō 'akānrāl [Economics concerning terrorism]. <http://www.kriengsak.com/node/2194>

Chitphiromsi, S., Lomlim, C., & Laiphaphon, S. (2012). Sētthasāt kānmūang wādūai kānphatthanā čhangwat chāidāen phāk tai nai thāmklāng pāt pī khōng khwām mai sangop [Political economy concerned with the development of southern border provinces during 8 years of insurgency]. <https://deepsouthwatch.org/th/node/2871>

Davis, D., & Weinstein, D. (2002). Bones, bombs, and breakpoints: The geography of economic activity. *American Economic Review*, 92(5), 1269–1289.

Department of Agriculture. (2013). Phatthanā khunnaphāp chīwit chāidāen tai dūai kasēttrakam [Improve the quality of life on the southern border with agriculture]. *Spring Newsletter*, 16(10), 2–5.

Frey, B., Luechinger, S., & Stutzer, A. (2007). Calculating tragedy: Assessing the costs of terrorism. *Journal of Economic Surveys*, 21(1), 1–24.

Freytag, A., Krüger, J., Meierrieks, D., & Schneider, F. (2010). The origins of terrorism: Cross-country estimates on socio-economic determinants of terrorism. *European Journal of Political Economy*, 27(1), 5–16. <http://hdl.handle.net/10419/119352>

Ismail, A., & Amjad, S. (2014). Determinants of terrorism in Pakistan: An empirical investigation. *Economic Modelling*, 37(C), 320–331.

Kitthaworn, P., Lertpipat, D., Poonsap, A., Sainui, S., Daoh, P., Pipitpan, N., Rakdee, O., & Chomaithong, S. (2007). *Impact of violence on safety lives and properties: A case study of people migration in three southern provinces of Thailand* [Research report, National Research Council of Thailand]. https://soreda.oas.psu.ac.th/show_detail.php?research_id=492

Krieger, T., & Meierrieks, D. (2011). What causes terrorism? *Public Choice*, 147(1/2), 3–27.

Mahouna, A., Fadina, R., & Barjolle, B. (2018). Farmers' adaptation strategies to climate change and their implications in the Zou department of south Benin. *Environments*, 5(15), 2–17. <https://doi.org/10.3390/environments5010015>

Marohabout, P., Choonpradub, C., & Kuning, M. (2009). Terrorism risk modeling in southern border provinces of Thailand during 2004 to 2005. *Songklanakarin Journal Social Sciences and Humanities*, 15(6), 885–895. https://soreda.oas.psu.ac.th/show_detail.php?research_id=503

Miguel, E., & Roland, G. (2005). The long run impact of bombing Vietnam. *Journal of Development Economics*, 96, 1–5. <https://doi.org/10.1016/j.jdeveco.2010.07.004>

National Statistical Office. (2019). Chamnūan khrūarūan kasēttrakōn thī khūn thabīan kasēttrakōn čhamnāek rāi čhangwat Phō. Sō. 2557–2561 [2014–2018 Census of registered agricultural households classified by province]. <http://statbhi.nso.go.th/staticreport/page/sector/th/11.aspx>

Office of the National Economic and Social Development Board. (2009). Phænkān phatthanā phūrnthī phisēt hā čhangwat chāidāen phāk tai pī 2552-2555 [Development plan for special areas in the 5 southern border provinces 2009–2012]. <http://slbkb.psu.ac.th/xmlui/bitstream/handle/2558/1068/แผนพัฒนาพื้นที่พิเศษ%20จังหวัดชายแดนภาคใต้.pdf?sequence=1&isAllowed=y>

Sama-air, A., & Mhadmarn, H. (2016). The opinion of community leaders on economic development of government in three southern border provinces. *Al-Nur Journal of Graduate School of Fatoni University*, 11(20), 151–164. https://so01.tci-thaijo.org/index.php/NUR_YIU/article/view/77808/62388

Sanongphan, S. (2012). The political violence in the three southern border provinces of Thailand. *Research Journal of Rajamangala University of Technology Srivichai*, 4(2), 31–45. <http://rdi.rmutsv.ac.th/rmutsvrj/download/year4-issue2-2555/p31.pdf>

Singh, P. (2012). Insurgency, crime, and agricultural labor expenditure: Evidence from Punjab, 1978–1990. *Economics of Peace and Security Journal*, 7(2), 33–40.

Songsom, A. (2009). Household economy in Pattani province under the southern unrest. *Journal of Humanities and Social Sciences*, 5(2), 37–70. <https://so03.tci-thaijo.org/index.php/eJHUSO/article/view/85872>

Thaksin University. (2017). Phæn phatthanā klum čhangwat phāk tai chāidāen sī pī (Phō. Sō. 2561–2564) [Four-year development plan for southern border provinces (2018–2021)]. https://www.osmsouth-border.go.th/news_develop